73 THE EFFECT OF I.V.IMMUNOGLOBULINS ON NEUTROPHIL FUNCTION OF VERY LOW-BIRTH-WEIGHT NEONATES.

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The oxidative metabolism of peripheral blood,polymorphonuclear neutrophils was studied in 12 very low birth weight neonates (BW < 1500gr) using the technique of Luminol-dependent chemiluminescence. As stimulating agent a strain of Pseudomonas aeruginosa type 012,isolated from neonatal blood was used. The neutrophils of the 12 stressed neonates, 7 of which had respiratory distress and 5 severe infection, were tested during their first week of life. The chemiluminescence response was found to be very low in the neonates when compared with that found in 8 healthy adult controls ($p<0.001$).I.V immunoglobulin (sandoglobulin) 0,5g was given to these neonates daily for 6 days in order to enhance their host-defence mechanisms. Their neutrophil chemiluminescence response was measured before and immediately following the first dose of immunoglobulin administration. A rise in the chemiluminescence response of the neonates after the administration of immunoglobulins was found ($p<0.05$). No adverse reactions were observed and all the neonates who received this treatment survived. In conclusion I.V. administration of immunoglobulin in very low birth weight neonates enhances their host defence mechanisms as shown by improving their neutrophil function and increasing their survival.

74 CORD PLASMA HYPOXANTHINE (HX), VASOPRESSIN (AVP), AND ERYTHROPOIETIN (EP) AS PARAMETERS OF ACUTE BIRTH ASPHYXIA.

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The Apgar score correlates poorly with metabolic acidosis at birth. We evaluated the relationship of these 2 parameters to 3 other indices of asphyxia, cord plasma HX, AVP, and EP concentrations, in infants born with acute asphyxia after normal pregnancy.

During a 2-month period, at 972 consecutive deliveries, the umbilical cord was doubly clamped immediately after birth. 16 infants had an Apgar score of ≤6 at 5 min (group A). Their mean umbilical arterial (UA) pH was 7.18; only 3 had a pH ≤7.05. 17 infants had an UA-pH of ≤7.05 (group B).

Log mean of UA-HX was 15 ymol/l in group A (n=8) and 32 ymol/l in group B (n=10). In both groups combined, UA-pH and HX were significantly correlated (r=-0.57). Log mean of UA-AVP was 79 pg/ml in group A (n=5), and 603 pg/ml in group B (n=9). In both groups combined, UA-pH and AVP (r=-0.76) and HX and AVP (r=0.55) were correlated. Log mean of UV-EP was 32 mU/ml in group A (n=8) and 44 mU/ml in group B (n=13). UA-pH and UV-EP, nor any of the parameters and Apgar score were correlated. We conclude that UA-pH, HX, and AVP are related indices of acute birth asphyxia, defining a risk group different from that defined by Apgar score. UV-EP does not reflect acute asphyxia, which is in line with the known delay between a hypoxic insult and EP response.

75 LATE HYPONATRAEMIA IN PREMATURE INFANTS: THE ROLE OF ALDOSTERONE AND ARGININE VASOPRESSIN

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To assess the possible involvement of arginine vasopressin (AVP) in the pathogenesis of the late hyponatraemia of preterm infants,serial measurements of sodium balance,fractional sodium excretion,plasma and urine osmolality and sodium concentration and urinary aldosterone and AVP excretion were performed at a weekly intervals in 9 healthy premature infants (mean birth weight 1372 g, mean gestational age 31 weeks).

During the course of late hyponatraemia,there was a significant increase in urinary aldosterone and AVP excretion from 0.94 ± 0.16 to 4.30 ± 0.76 ug/day ($p<0.01$) and from 0.38 ± 0.08 to 1.19 ± 0.26 ng/day ($p<0.01$),respectively from the 1st to the 4-5th weeks.A significant negative correlation was found between fractional sodium excretion and urinary aldosterone excretion ($r=0.45$, $p<0.01$). Aldosterone excretion,however,correlated positively with urinary AVP excretion in 7 of 9 infants.

It is concluded that the parallel increase in urinary aldosterone and AVP excretion in salt-losing premature infants may occur in response to the protracted contraction of the extracellular fluid compartment and may contribute to the restoration of volume of body fluids and to the development of late hyponatraemia.

76 THE EFFECT OF DIET COMPOSITION ON ENERGY METABOLISM, SUBSTRATE UTILISATION AND GROWTH IN THE VLBW INFANT.

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Medium-chain-triglycerides (MCT) induce a decrease in fat storage in adult animals. To study the effect of MCT on quality of growth in the VLBW infant, oxidation (ox) and accretion (accr) of energy, protein, fat and carbohydrate have been measured in 20 growing VLBW infants, fed either an MCT enriched formula (gp 1; n=8) or an LCT formula (gp 2; n=12). 16 studies were performed in each group, combining indirect calorimetry, macronutrient balance and anthropometry.

X±SE	Energy (Kcal/kg.d)		Protein (g/kg.d)		Fat (g/kg.d)	
Results	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Intake	124.0±1.1	124.3±1.3	3.07±0.04 *	2.65±0.03	6.31±0.1	6.38±0.1
Losses	6.2±0.3 *	15.4±1.5	0.29±0.02	0.40±0.05	0.39±0.1 *	1.32±0.2
Ox.	57.0±1.6	58.0±1.3	0.45±0.03	0.43±0.03	1.54±0.2	1.10±0.2
Accr.	60.8±2.1 *	50.9±1.8	2.37±0.06 *	1.81±0.06	4.36±0.3	3.96±0.2

*p<0.001

Weight and length gain simulated intra-uterine growth rate in both groups. Subscapular skinfolds and calculated body fat were similar in both groups, but higher than in the fetus of comparable postconceptional age. CONCLUSIONS: 1) The similar energy expenditure and fat oxidation indicate that MCT are not preferentially oxidised. 2) Consequently, MCT have to be chain elongated before storage. 3) The improvement of protein accretion to a level exceeding the intra-uterine accretion rate and improved absorption for MCT vs LCT indicate that body composition can be manipulated by isocalorically altering diet composition.

77 RESPIRATORY WATER LOSS IN FULLTERM INFANTS ON THEIR FIRST DAY AFTER BIRTH.

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The water loss from the skin, has been considered to constitute around 75 % of the insensible water loss (IWL), the remaining 25 % being respiratory water loss (RWL). In previous studies we have found that the water loss from the skin varies with environmental factors such as ambient humidity and air flow velocity, and with factors related to the infant, such as gestational age and postnatal age. In very preterm infants nursed in a dry environment the water losses from the skin were found to be very high on the first days of life.

We have developed a method for measurement of RWL to be used in newborn infants. RWL is measured in an open flow-through-system, where air drawn over the face of the infant, picks up the expired gas. The flow of mixed gas is measured with a Fleisch flow-head connected to a differential pressure transducer, and the concentrations of water vapour, oxygen and carbon dioxide in the mixed gas and in the ambient air are measured with a Perkin Elmer mass-spectrometer. RWL, oxygen consumption and carbon dioxide production are calculated from the obtained flows and concentrations. Measurements were made on the first day of life in normal, fullterm infants. During the measurements the infants were placed in incubators with carefully controlled air temperature, humidity and air flow velocity.

RWL was around 5 mg/kg min or 25 g/day per infant with the infant at rest in an ambient humidity of 50 % and an ambient temperature of 32.5 °C. Oxygen consumption was around 7 ml/kg min and RQ was around 0.8. Both RWL and oxygen consumption increased with increasing motor activity. When the infant was crying RLW often increased by 100 % as compared to at rest. A linear relationship was found between RLW and ambient humidity with higher values at a low humidity than at a high one.

78 KEY ENZYMES OF ADENINE NUCLEOTIDE CATABOLISM IN FIRST AND THIRD TRIMESTER HUMAN TROPHOBLAST

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Despite the importance of the placenta for fetal homeostasis, energy and purine metabolism in developing versus ageing trophoblast has not been studied. We have developed methods for isolation and characterization of placental cells, and measured the apparent activities of 5'-nucleotidase and AMP-deaminase, key enzymes in adenine nucleotide catabolism, in 1st and 3rd trimester preparations. Trophoblastic cells were separated using 0,3% collagenase and 0,001% DNAase, followed by filtration and isopycnic centrifugation using Percoll (R). Over 95% of the cells banding at the density of ca. 1,02 g/ml were trophoblasts expressing cytokeratin but not vimentin intermediate filaments. The enzyme activities were measured in cell sonicates using 14-C-AMP as substrate with final concentrations 2 mM (AMP-deaminase) and 0,3 mM (5'-nucleotidase).

	5'-nucleotidase nmoles/mg protein/min	AMP-deaminase nmoles/mg protein/min
1st trimester	71,26 ± 40,47 (SD)	24,90 ± 9,52 (SD)
3rd trimester	43,56 ± 15,19 (SD)	20,80 ± 8,36 (SD)

The activity of trophoblastic AMP-deaminase does not change with gestational age. Mean total activity of 5'-nucleotidase is higher in the 1st trimester trophoblast but individual placentae show large variation. Gestational age does not appear to be a major determinant of 5'-nucleotidase activity.